



Climate Risks and Opportunities

White Paper presenting the current state in Indian Financial sector and emerging directions

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About Climate Policy Initiative (CPI)

With deep expertise in finance and policy, CPI is an analysis and advisory organization that works to improve the most important energy and land use practices around the world. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has six offices around the world in Brazil, India, Indonesia, Kenya, the United Kingdom, and the United States.

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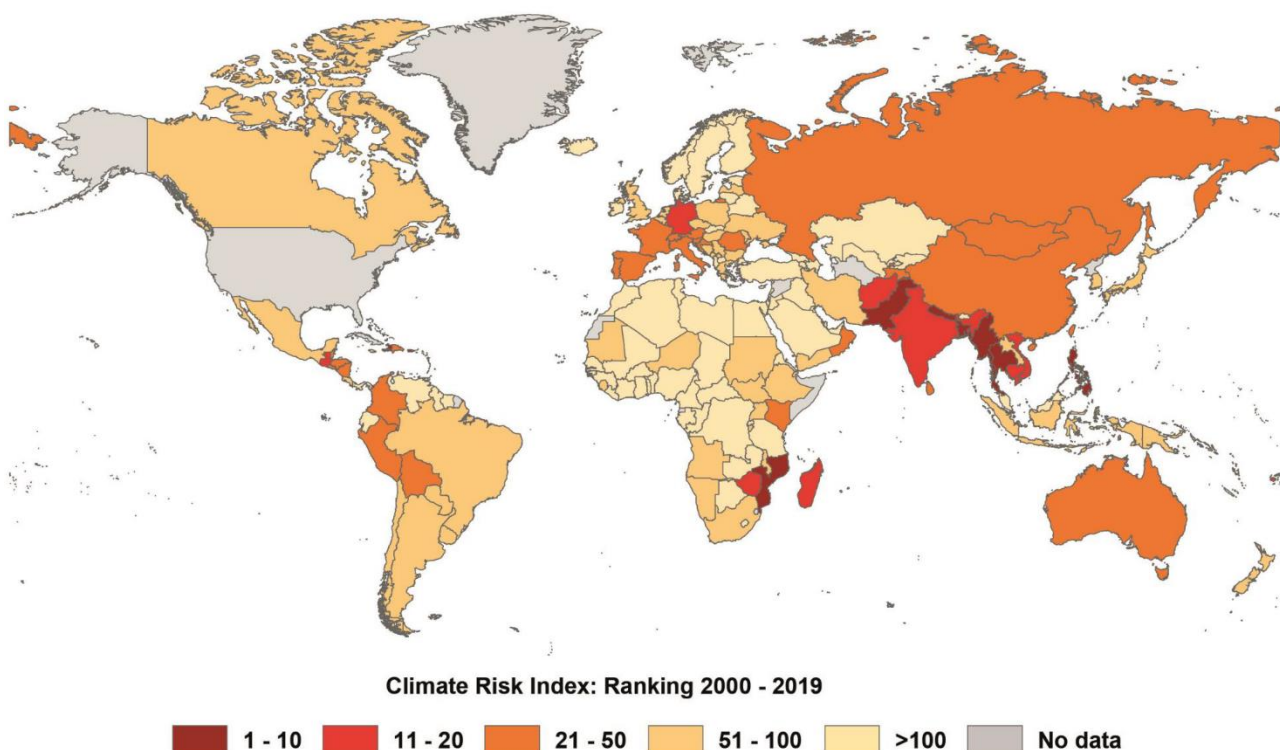
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1. Context: Climate Change and Impact on India

India is one of the most vulnerable countries to the impacts of climate change, ranking 7th out of 181 in the Global Climate Risk Index 2021. More than 75% of Indian districts are hotspots for extreme climate

events¹. It is clear that climate change poses a significant threat to India, with one study suggesting that it could shave off 2.5%–4.5% of India's GDP annually if not tackled timely².

Figure 1: World Map of the Global Climate Risk Index 2000-2019



Source: Global Climate Risk Index 2021, GERMANWATCH

Taking action to mitigate the impacts of climate change and build resilience among communities is of great importance for India to sustain its developmental trajectory while simultaneously tackling climate change. To address climate change and its impact, it is estimated ~ NR 162.5 tn (USD 2.5 trillion) from 2015 to 2030, or

roughly INR 11 tn (USD 170 billion) annually will be required. This is also in sync with IFC estimates³ of INR 195 tn (USD 3 trillion) worth of climate investment opportunities in the country from 2018 to 2030. Current investment, according to soon to be published CPI study, is ~ INR 3.09 tn (USD 44 billion) per annum only.

¹ Source: [Preparing India for Extreme Climate Events \(CEEW 2020\)](#)

² [McKinsey Global Institute \(2020\) - Will India get too hot to work?](#)

³ Source: Climate Investment Opportunities in Emerging Markets An IFC Analysis

While there has been increased focus on green and sustainable finance and India has seen action from policy makers (Finance Ministry – Dept of Economic Affairs, DEA) and regulators (RBI and SEBI), the market still grapples with problems of limited contextual knowledge, complex calculations, unprecedented areas of growth and limitations of existing investment mechanisms, among others. This is further compounded by information asymmetry, absence of taxonomy for green and sustainable activities and headwinds due to COVID 19 – all of which have led to a limited progression of green and sustainable finance across both banking and capital markets. Some initiatives are now underway at policy and regulation front to address some of these challenges. These include:

- DEA, Ministry of Finance has initiated a Sustainable Finance Task Force to chart out India’s Sustainable Finance Roadmap – this effort entails a Working Group with participation from the Reserve Bank of India, or RBI (Central Bank) and the Securities and Exchange Board of India, or SEBI (Capital Market Regulator)
- The Central Bank - RBI has joined the Network or Greening the Financial System (NGFS) in 2021, an association of central banks of more than 100 member countries; and RBI has also set up its own Sustainable Finance Group.

- SEBI has issued a Consultation paper on Green and ESG ratings⁴ in January 2022 and had defined Green Bonds earlier
- The Govt of India Budget announcement (Feb 2022) signaled India’s willingness to borrow internationally through Sovereign Green Bonds and invest in low carbon/green development of Indian economy.

However, one core area which hasn’t gained requisite prominence as yet is climate risk and its sensitivity to the financial system. Climate risk manifests in two ways:

- **Physical Risks** cause direct harm to assets or disrupt Industry / company value chains
- **Transition Risks** arise from the overall shift to a low carbon economy through changes in policy, technology and market sentiment

Both impair asset values and credit quality of loans and investments from banks, financial institutions, and capital markets. Apart from credit quality, climate risks also have an impact on market and operational risks.

Given the above context, this paper aims to look at how climate risks impact financial markets – banking, capital markets, and insurance - and the opportunities this presents for investments and product innovation.

⁴ Source: [Consultation Paper on Environmental, Social and Governance \(ESG\) Rating Providers for Securities Markets \(SEBI 2022\)](#)

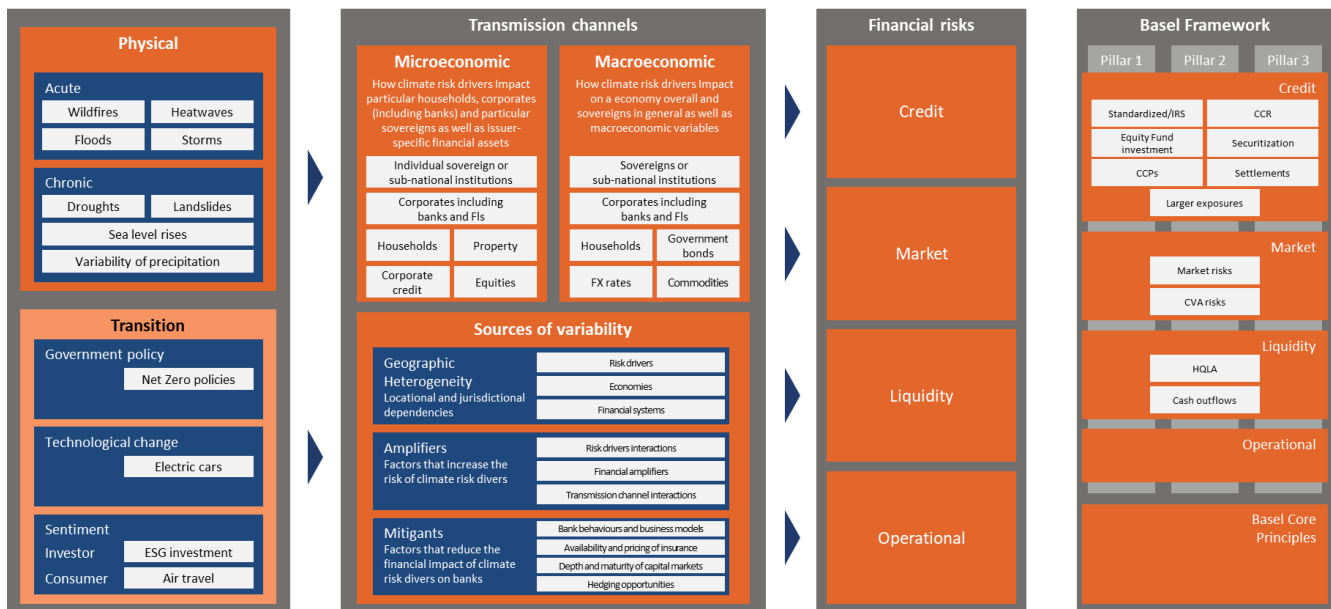
2. Climate Risks in Financial System

2.1 Demystifying Climate Risk

A recent report by the Basel Committee on Banking Supervision titled ‘Climate-related risk drivers and their transmission channels’ suggests how banks and the banking system, in particular, are exposed

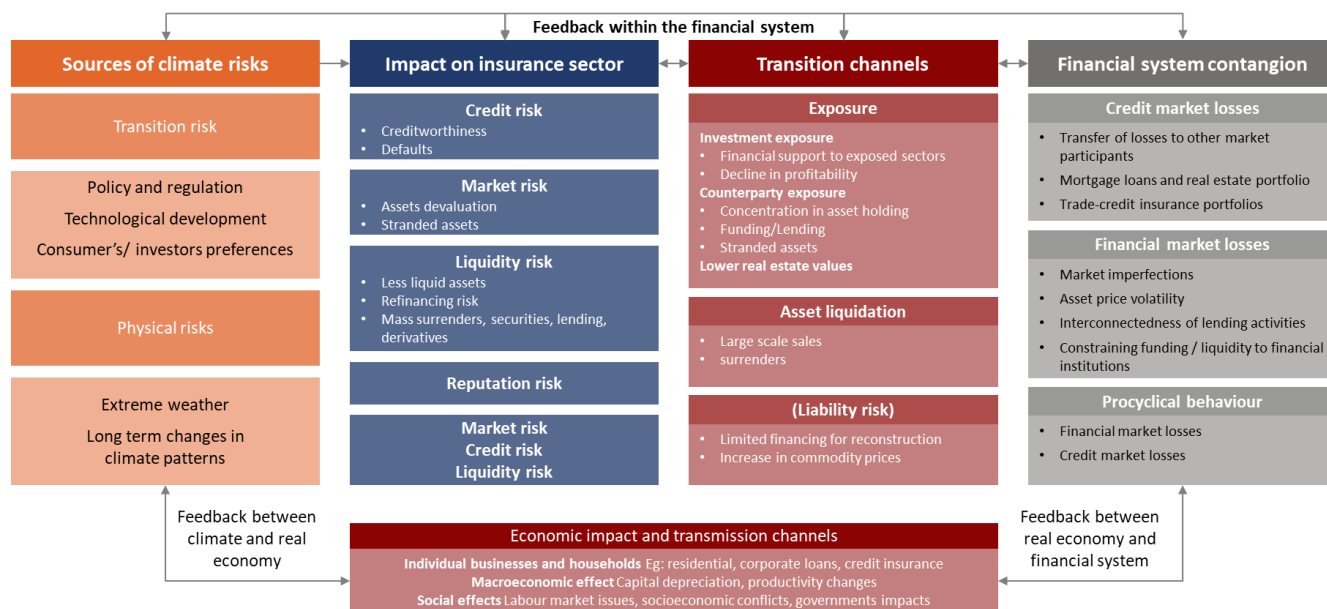
to climate change through macro and microeconomic transmission channels. Synthesis is provided in Figure 2 below. A similar explanation for the insurance sector is provided in Figure 3.

Figure 2: Financial risks from climate drivers for the Banking Sector



Source: ‘Climate-related risk drivers and their transmission channels’, Bank for International Settlements

Figure 3: Financial risks from climate drivers for Insurance Sector



Source: 'Global insurance market report: The impact of climate change on the financial stability of the insurance sector', International Association of Insurance Supervisors (September 2021)

Sectoral analysis indicates that the impact of climate change risks will be high on both the banks and the investors. An illustrative overview of the

financial sector portfolio in India based on the likely sensitivity /impact of the climate risk is provided below.

Figure 4: Financial sector portfolio in India based on sensitivity of climate risk⁵

Bank Credit at Risk			Climate Risk ✓ Physical risk ✓ Regulatory risk ✓ Reputation risk ✓ Competition risk ✓ Litigation risk ✓ Production risk	
Gross bank credit \$1.2 tn	First Impact and High at Risk	Knock-on effect for heavy users of energy or dependent industries		Sectors that act as 'carbon sink'
	Minning and Quarrying	Transportation		Agriculture & Allied Activities
	Power Generation & Utilities	Steel & Metals		Forestry
	Resource-based (cotton, leather, wood, paper, rubber, plastic)	Chemicals & Chemical products		
	Oil and Gas	Cement & construction		
	Water systems	Engg., Industries, Manufacturing		
	Agriculture and Allied Activities			
Loans at risk \$273bn	Loans at risk \$209 bn	Loans at risk \$164 bn		
Capital Market Exposures at Risk				
Capital Mkt investments \$800bn	Investment in banking & Fin. Services	\$195 bn		
	First Impact and High-at-Risk sectors	\$72 bn		
	Knock-on effect for heavy users of energy or dependent industries	\$112 bn		

⁵ Warming Up; State of Sector of Green Finance in India, 2021

It is important to understand how the risks may manifest in the system and identify potential management and mitigation mechanisms. Climate

risks are not standalone and manifest in various ways. While climate risks are not classified as Pillar 1 risks,⁶ they have an impact on the current Pillar 1 risks as shown in 1 below.

Risks	Credit	Market	Operational
Transition	<ul style="list-style-type: none"> • Lower valuation of assets and collaterals • Impaired Loan portfolio due to stranded assets • Higher expected default by carbon-intensive sectors 	<ul style="list-style-type: none"> • Higher energy and commodity prices • Higher transaction costs due to weakened economic conditions 	<ul style="list-style-type: none"> • Higher reputational risks by investing in carbon-intensive sectors
Physical	<ul style="list-style-type: none"> • Higher expected default by climate-vulnerable sectors such as agriculture and tourism • Lower valuation of properties in coastal areas due to increased risk of coastal flooding and coastal erosion 	<ul style="list-style-type: none"> • Downgrade of credit ratings of borrowers including sovereigns due to extreme weather events 	<ul style="list-style-type: none"> • Relocation of headquarters and data-centers
Liability	<ul style="list-style-type: none"> • Supply chain disruptions can be generated by augmented damages and losses to property and assets 	<ul style="list-style-type: none"> • Increasing costs from insurance premiums 	<ul style="list-style-type: none"> • Higher reputational risks due to breach of fiduciary duty

Table 1: Climate risks mapped to pillar 1 risks

It is therefore important to ensure proper risk measurement and management for climate risks.

2.2 International Best Practices

Internationally, regulations around climate risk management including stress testing and disclosures are being introduced. A review of the regulations across UK, EU, Singapore and Australia indicates an acknowledgement that climate related financial risks will impact other risk categories like credit risk, market risk, and operational risk. In each of the guidance/guidelines, the concerned regulator has maintained focus on three core areas – Governance, Risk Management and Disclosures.

It is also noteworthy that most jurisdictions came out with separate regulations for asset managers, bankers and insurance agencies. This highlights the requirement to tackle climate related financial risks across the spectrum.

Globally 4 key agencies are putting forth research as well as policies which inform international best practices:

1) Network for Greening the Financial System (NGFS)

Network for Greening the Financial System (NGFS) is a coalition of 66 central banks and supervisors committed to improve climate and environment-related risk management in the

⁶ <https://www.bis.org/bcbs/basel3/b3summarytable.pdf>

financial sector and mobilize capital to meet the goals of Paris Agreement. For this, NGFS produces scenarios analyzing both physical and transitional climate risks to the economy and financial system. Their tool '[Climate Impact Explorer](#)' can help decision making by synthesizing projections for physical climate risks at national and sub-national level. Based on research on their climate models and scenarios, NGFS produces case studies and best practices for the financial sector to help accelerate action.

2) Intergovernmental Panel on Climate Change (IPCC)

The contribution of IPCC in the climate change sector is unparalleled. IPCC has been a pivotal body in communicating the science behind climate change and provides governments and policymakers with scientific assessments on climate change, its potential future risks, and suggestions for adaptation and mitigation.

IPCC reports constructs scenarios based on increase in emissions levels showcasing a variety of plausible futures, informing governments of the risks of inaction. The use of these scenarios is crucial for the development of stress tests and scenario analysis as has been explained in Annexure A. IPCC also produces reports and other knowledge products to guide and facilitate action on climate change.

3) Basel

The Basel Committee on Banking Supervision (BCBS) is a primary agency for setting global standards for regulating banks to enhance financial stability and is an important forum for regular cooperation on banking supervisory matters. In 2020, BCBS established a task force to assess climate-related financial risks and strengthen regulation and supervision of banks. Along with that, it produced principles for effective management of climate-related financial risks. It had published a consultation

paper on principles for climate risk earlier in 2022 and the final paper is expected to be published soon.

Considering, BCBS's large network of banks and regulators, these initiatives can be crucial to guide and provide financial institutes with the push to align to realities of climate change and goals of Paris Agreement.

4) International Sustainability Standards Board (ISSB)

It is a standard-setting body established in 2021 by a non-profit organization- *International Financial Reporting Standards (IFRS) Foundation*.

ISSB's primary function is to compile a global baseline for disclosure standards on ESG. However, due to pressing need of data on climate change and emissions, ISSB will begin with begin with compiling standards on climate change. These standards will build on work of already existing standards such as will be Climate Disclosure Standards Board, the Task Force for Climate-related Financial Disclosures (TCFD), the Value Reporting Foundation's Integrated Reporting Framework and SASB Standards. Through this initiative, ISSB can help bring clarity and coherence in the space of sustainability disclosures, reducing the 'noise' in ESG disclosures. However, the adoption of these standards will depend on national governments or legislation.

From an Indian perspective, the takeaway is to:

- 1) Ensure that impact of climate related risks on different portfolios is captured sufficiently
- 2) Identify the impact of climate related financial risk on other risks, especially Pillar 1 risks
- 3) Put in place comprehensive disclosure requirements
- 4) Emphasize the need and maintenance of monitoring and regular review mechanisms

The above have to be done keeping in mind the capital adequacy requirement as well as a longer-term view of risk management, monitoring and mitigation.

2.3 Challenges in the Indian context

While section 2.1 lays out the landscape for FIs, there is a need to identify the challenges encountered in climate risk measurement and management. This sub-section looks at some of the challenges that the Indian Financial System may face in climate risk management.

- a) Data – there is limited data available on both transition and physical risks factors. Data collection currently is not at par with international standards and thus data present is incomplete and not sufficiently reliable.

Data Disclosure requirements of Different regions

EU

EU introduced guidelines on reporting of climate risk data in 2017 and updated the guidelines to align with TCFD in 2019. However, it was not mandatory for banks to report on these guidelines. ECB produced an annual report for benchmarking the performance in the sector which acted as a light touch incentive. With the new EU taxonomy coming into effect in 2022, reporting on climate risk is mandatory for all from January 2024. Lenders will report on their exposure to climate change risks and the measures taken for mitigation, as well as their level of financed greenhouse gas emissions and their alignment with 2050 net-zero goals. The extent of alignment will be expressed by two metrics: the [Green Asset Ratio](#) (GAR) and the Banking Book Taxonomy Alignment Ratio (BTAR).

Hong Kong

The Hong Kong Monetary Authority (HKMA) framed guidelines based on TCFD framework and conducted a pilot climate risk stress test (CRST) in 2021 to measure climate risks and assess the climate resilience of the Hong Kong banking. Participating banks assessed their climate risk exposures under 3 scenarios: a physical risk scenario involving a worsening climate situation and 2 scenarios envisaging orderly and disorderly transitions to a low-emission economy.

While the participation in 2021 was voluntary, going forward, all financial institutes are mandated to disclose climate-related data no later than mid-2023.

UK

The government of UK introduces the *Companies (Strategic Report) (Climate-related Financial Disclosure) Regulations* and the *Limited Liability Partnerships (Climate-related Financial Disclosure) Regulations* in 2022, making UK the first G20 country to enshrine in law mandatory TCFD-aligned disclosures. From April 2022, all large companies and financial institutes based in UK have to report on non-financial climate risks and opportunities.

- b) Current Risk Management Practices – Unlike the developed economies, India is still in the ‘nascent’ stages of risk management. In Banking, Indian Banks calculate capital using Standardized approach thus adding to the problem of data availability and dependence on regulation. This impacts the data collection process since capital allocation is dependent on external ratings instead of internal credit ratings. Banks in India do have internal rating models, however the data captured in those is not as comprehensive as present in international markets. Apart from data challenges, reliance on credit ratings also has an impact on capital flow. As per a recent CPI publication⁷, “the current approach adopted by

⁷ CPI (2022). Mobilizing Green Finance while Managing Climate Finance Risks in India

credit rating agencies is not conducive to capital allocation for green activities, especially those activities concerned with resilience and adaptation. Given the impact of climate change on business results, it is expected that green projects would have good credit quality over the longer term. However, the current rating framework does not capture this.” Insurance and Capital markets are not mature and majorly regulatory driven. This creates a challenge since the progress is dependent on regulation and not always on internal institutional capability.

- c) Capacity Building – Given the ‘nascent’ stages, there is a gap between the knowledge required to deal with climate changes and the risks emanating from it.
- d) Policy vs Regulation – Risk Management is typically a regulatory aspect, but one of the crucial building blocks is under policy i.e. taxonomy. So, while the regulator has been working on green finance and climate finance, there is no green taxonomy in place as yet.

3. Way Forward

While the above challenges exist, potential approaches can be undertaken in the short to medium term to not only start framing resilience in the system to these evolving risks but also innovate the product offerings.

Integration

To manage these risks, identification is the first step. Towards this, FIs can take a concrete step and strengthen their **disclosure norms**. This will have to be done for both banks and their customers. It is very important for the emission data to be captured. While SEBI has launched BRSR and it highlights the need to start focusing on Climate, it is limiting in its current form:

- a) Framework is more aligned to the real sector and needs significant adaptation to comprehensively capture the financial sector situation
- b) Focus on Climate is limited and thus a strong foundation for climate risk measurement and management is missing

RBI has not yet released norms on disclosures required by banks. One of the tools that can be used by regulators to improve disclosures is use of **Internal Capital Adequacy Assessment Process (ICAAP)** framework and Supervisory Review and Evaluation Process (SREP). Regulators can also set clear guidelines under SREP on areas pertaining to a) Governance, b) Strategy, c) Risk Management, d) Scenario Analysis and Stress Testing, and e) Disclosures. NGFS encourages supervisors to set their expectations in line with TCFD. Given RBI joined NGFS in July, 2021, banks may look at incorporating principles of TCFD in their reporting and disclosure frameworks.

TCFD Framework

TCFD Final Report, 2017 singles out physical and transition risk as the main sources of climate risk. Recommendations provided by TCFD focus on disclosures being reported under four headings:

- 1) Governance – What governance structures are in place to address and take responsibility for climate issues
- 2) Strategy - What is the strategy surrounding climate change
- 3) Risk Management - What processes are there in place to manage climate risk
- 4) Metrics and Targets – Metrics used by the firm to assess climate-related financial risk

Since 2017, things have changed and progressed around the world pertaining to disclosures.

TCFD publishes a status report and as per the 2021 status report, certain key findings are:

- 1) While disclosures increased significantly between 2019 and 2020 than any other previous years, however significant progress is still required as an average of only one in three companies reviewed disclosed climate-related information aligned with the TCFD recommendations
- 2) Disclosure on climate risk and opportunities remains what companies are most likely to disclose
- 3) Disclosure of the resilience of companies' strategies under different climate-related scenarios is the least reported
- 4) The insurance industry significantly increased its average level of disclosure between 2019 and 2020, and now leads all groups in disclosure of risk management processes

Adoption of TCFD (or equivalent framework) by most institutions, if not all, is required. In India, progress can be accelerated with the right regulatory prescriptions.

Another step that can be taken is **design and application of stress tests and scenario analysis** specifically for assessment of climate risk on their portfolio. These are useful tools since applying traditional risk quantification and measurement techniques for climate risk poses challenges. These include lack of data, inability to use historic data for physical events due to changing nature of the same⁸ and insufficiency of collected data. Design of stress tests will need to be done at both the micro⁹ and macro¹⁰ prudential level.

While RBI comes out with further guidelines on this, institutions may design preliminary analysis to see impact on their loan books from both transition and physical risks. Adoption of a comprehensive framework like the TCFD is likely to be helpful on this front. Annexure A proposes a sample stress test design framework.

Product Innovation

Launching new products across banking, insurance and capital markets is not only important but also necessary. Launch of tailored insurance offerings, green FDs, sustainability linked bonds, sustainable bonds etc. are a few examples of product innovation needed to help in better management of climate related financial risks.

Given the diversity in the Indian financial sector as well as specific nuances, it is important to look at Banking, Insurance, and Capital markets separately – some facets are discussed in the section below.

3.1 Progressing the Indian financial sector on a Climate integrated pathway

3.1.1 Banking

RBI has conducted preliminary scenario analysis and stress tests¹¹ to understand the impact of fossil

fuels on bank credit (both direct and indirect). The study showed that while sectors which are directly dependent on fossil fuels do not account for a large portion of bank credit, however other industries which are indirectly dependent on fossil fuels, account for a sizable portion of bank credit. This shows the need to design strategies and risk measurement measures which take into account the various nuances associated with the banking sector. Some factors, in our opinion, which should be considered are:

- 1) Sector and Industry – Impact of transition and physical risk on sectors should be evaluated. For example - do the sectors have dependence on fossil fuels – be it direct or indirect?
- 2) Nature of exposure – For example, for existing exposures, close monitoring and frequent revaluation would be needed, for new exposures, metrics which measure impact of climate related financial risk should be included.

Another aspect which has to be factored in is the MSME industry in India. As per a 2021 RBI report, the credit gap for the MSME sector is estimated to be between INR 20 to INR 25 trillion. Given that green is perceived as high risk, credit to the MSME sector will get further constrained. Climate risk measurement and management will have to account for this particular aspect. In the past, credit guarantees have been used in India to extend credit to the MSME sector. Sector specific interventions on this front are needed to jump-start the MSME portfolio transition in particular.

3.1.2 Insurance

The question in insurance is two-fold: – are the current offerings sufficient and are the current offerings efficient?

⁸ Owing to increase in frequency and severity of physical events, previous data is less reliable

⁹ Micro prudential refers to firm-level

¹⁰ Macro prudential refers to financial system as a whole

¹¹ [RBI Bulletin \(2022\) - Green Transition Risks to Indian Banks](#)

Are the current offerings efficient?

As per a **report by the Insurance Regulator (IRDAI), unpaid insurance claims for natural disasters in 2020-21 amounted to INR 17.05 bn - 66.6% of the total claims raised** ! In contrast the claims raised by individuals under Pradhan Mantri Jeevan Jyoti Bima Yojna had a payout rate of over 87%. The natural disasters during this period included Cyclone Amphan and Nisarga, and floods in Maharashtra and Andhra Pradesh. This indicates a problem with the insurance companies not fulfilling their promise for natural disaster insurance claims. As per the study, this is arising in many cases due to reinstatement of property not having taken place. Given that extreme weather events are on the rise, this problem will need to be solved at the earliest so as to not cause further disruption to life of the population affected by these events.

The above also raises a question – Are the current offerings sufficient? India, as a country does not offer parametric insurance¹² widely. Parametric insurance payouts are determined based on the physical features of a natural hazard event, such as wind speed for typhoons rather than on actual losses. Given this, payouts can be expected quickly (~15 days) as they avoid the lengthy loss assessment, thereby providing rapid access to early recovery financing.

Insurance pools reduce the price of premiums in several ways – Diversification, Economies of scale, and profit retention. In case of parametric

insurance, the pay-out is event determined and hence will not have the same concerns as witnessed with the current insurance offerings.

3.1.3 Capital Markets

In case of capital markets, introduction of carbon ratings may act as a catalyst in emission reduction. The rating framework should ideally look at carbon emission per unit of capital. Guidance for developing such a framework could be taken from the Green Loan Principles and BIS paper published in BIS Quarterly Review, September 2020¹³. The rating framework design given by BIS is anchored on three main objectives¹⁴:

- Additional incentives¹⁵ for the rated companies to contribute to the attainment of climate goals such as those of the Paris Accord
- Enabling decision-making process of the investors in general and in specific, help those investors who don't have the resources to do their own "green" due diligence
- System should allow investors and other stakeholders (e.g., auditors, regulators and policymakers) to check firms' improvements and verify that the desired climate mitigation effects are achieved

Apart from the above, focus on disclosures is very important. While BRSR has been introduced by SEBI, there is need for greater focus on disclosures pertaining to climate change.

¹² Parametric insurance is an insurance product which offers payouts based on trigger events.

¹³ BIS. September 2020. Available at: https://www.bis.org/publ/qtrpdf/r_qt2009c.pdf

¹⁴ Ibid.

¹⁵ One example of this could be issuance of Sustainability Linked Bonds (SLBs) which could be issued with KPIs defined around reduced emission targets

A person's profile is visible on the left, holding a smartphone. The background is a dark green field with a network of white icons connected by lines. The icons include a person with a dog, a person with a laptop, a tractor, a person with a gear, a person with a location pin, and a person with a gear.

4. Intensification of action by financial sector leaders need of the hour

The last two years have seen great strides being made by policy makers, regulators and even market players. While the foundation is being laid, there is still a lot more to be done, especially in the area of climate risk measurement, management and mitigation especially for the financial sector. While integration and product innovation is the way forward, it is important to recognize that each

sector – banking, capital markets, and insurance – will need solutions which are tailormade to it. For example, in the banking sector the need of the hour is risk management and disclosure whereas, in Insurance, the need to relook the current offerings is far greater. This paper has tried to look into some of the steps that can be taken to better manage and measure climate related financial risks.

Annexure A – Stress Test Design Considerations

While there are various stress tests that have been developed by different regulators, we aim to provide design considerations which may be useful for designing stress tests for India. The design can be evolved based off approaches proposed by Baudino et al (2018) and FSI Insights on policy implementation No 34 respectively.

- Baudino et al (2018) proposes an approach for developing a stress testing exercise the following three main building blocks: (i) governance; (ii) implementation, including scenarios, technical requirements and design; and (iii) outcomes, including results and publications.
- FSI Insights on policy implementation No 34 talks about changes in 3 areas as compared to a regular solvency focused stress test. The three areas being: a) scenario design, b) modelling approaches, and c) data issues.

Scenario design

- a) Given India's vulnerability to climate change, it is imperative that the stress tests take into consideration both transition and physical risk.

Transition Risk – For India to transition smoothly and achieve net zero by 2070, it is important to adequately account for policy, regulatory and technological changes.

Physical Risk – Given India's vulnerability to extreme weather events, the design of the tests need to be done so as to account for both

increased frequency and severity of extreme weather events.

- b) Unlike countries like US, UK or those under ECB jurisdiction the quantum of data available in India is limited and the quality is not fully reliable. Therefore, the scenarios need to be designed to ensure that complexities are included. The scenario design may initially have to be driven by the RBI to achieve the desired results.
- c) India is still an emerging economy which also means that there needs to be ample focus on the MSME segment. Number of scenarios for the Indian Banking system may need to be on the higher side to account for various nuances associated with the system. For example, a scenario for priority sector lending portfolio, one for agriculture sector, one for MUDRA scheme, one for MSME etc. would be required.
- d) Selection of the right base scenario is very critical. Currently, scenarios are developed by a few institutions, but the most prominent ones are [Intergovernmental Panel on Climate Change \(IPCC\)](#) and [Network for Greening the Financial System \(NGFS\)](#). In the Indian context, it is important to use a mix of the two – IPCC for transition and NGFS for physical risk. Within IPCC specifically, use of the combination of RCPs¹⁶ and SSPs¹⁷ are important for India.

¹⁶ Representative Concentration Pathway (RCP) set pathways for greenhouse gas concentrations and, effectively, the amount of warming that could occur by the end of the century. Available at: <https://www.carbonbrief.org/explainer-how-shared-socioeconomic-pathways-explore-future-climate-change/>

¹⁷ Shared Socioeconomic Pathways (SSP) SSPs set the stage on which reductions in emissions will – or will not – be achieved. Available at: <https://www.carbonbrief.org/explainer-how-shared-socioeconomic-pathways-explore-future-climate-change/>

Data

While most regulators will face the challenge of data availability and reliability, the challenge for Indian Banks is greater. Indian Banks still account for capital using Standardized Approach which is not very conducive to large data collection. Furthermore, the regulatory policy on disclosure as defined by SEBI is not climate centric and RBI has yet not issued any guidance around this. This makes the challenge even greater. Therefore, for any stress test and scenario analysis design to work, there is a need for data sharing to take place. Strides have been made to enable data sharing by RBI in the past ([CRILC](#)) and it would be crucial that going forward the same approach is taken.

Modelling

As described in the FIS paper, there are four steps for modelling:

- a) description of climate phenomena and their impact on a specific climate metric
- b) quantification of the impact of the changes to the climate metric on a traditional macroeconomic indicator
- c) breakdown into sector and geographies
- d) combine elements to compute the impact on banks

The first and third step, especially, are crucial in the Indian context.

- The first step requires modelling to ensure parity with current policy and regulatory regime. This is also important since different parts in India are impacted differently by climate change. For example, while Mumbai is in the danger of flooding, Delhi has dangers of extreme heatwave. While both are extreme weather events, they will have different impact on productivity and thus the loan book of banks.

- The third step evaluates the impact of macroeconomic effects on specific economic sectors. The paper has undertaken a deep-dive on this specific granularity.

Granularity

Given the Indian scenario, a top-down approach to stress testing might be the desirable first step. This approach focuses on approaching stress testing from a macro prudential lens. Banks, can then build upon the defined tests and add the required granularity to understand the impact on their own portfolios.

Governance

The last but not the least, the important aspect is Governance and the importance of sensitivity and understanding required to not only design but also implement stress tests in Banks. A key factor in ensuring strong and proper governance at all levels is capacity building. It is vital that Banks invest in capacity building for staff at all levels of decision making so as to ensure that the design and implementation of stress testing is efficient and useful.